

# Alfred Quadrangle, Maine

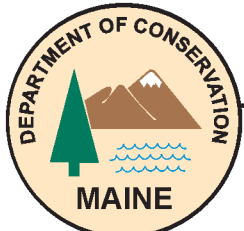
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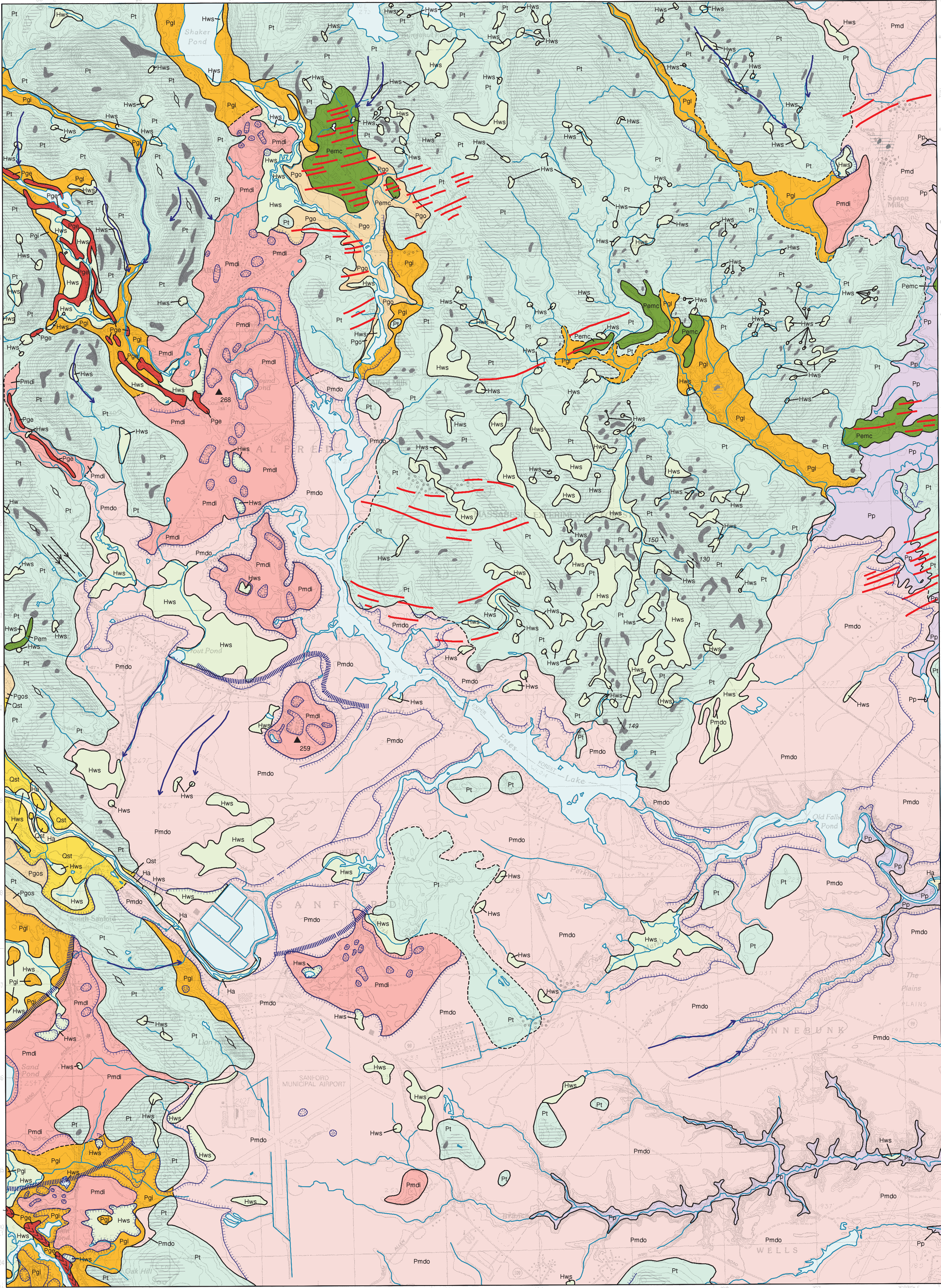


## Maine Geological Survey

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# Surficial Geology



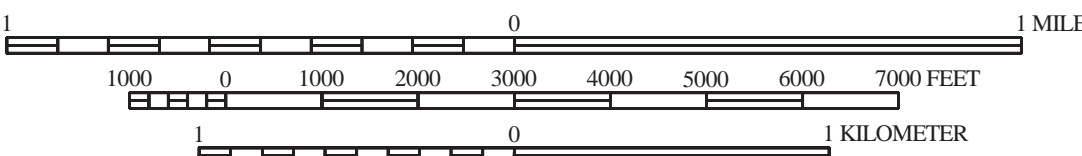
### SOURCES OF INFORMATION

Surficial geologic mapping by Craig D. Neil completed during the 1995-1999 field seasons; funding for this work provided by the Maine Geological Survey. Geoffrey W. Smith conducted surficial geologic field work during the 1984 and 1985 field seasons, funded by the Maine Geological Survey.



Quadrangle Location

SCALE 1:24,000



CONTOUR INTERVAL 20 FEET



Topographic base from U.S. Geological Survey Alfred quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not implicate responsibility for any present or potential effects on the natural resources.

<b>Ha</b>	<b>Stream alluvium</b> - Gray to brown fine sand and silt with some gravel. Comprises flood plains along present streams and rivers. Extent of alluvium approximates areas of potential flooding.
<b>Hw</b>	<b>Wetland</b> - Muck, peat, silt, and sand. Poorly drained areas, often with standing water. Hws-wooded swamps; Hw-undifferentiated.
<b>Qst</b>	<b>Stream terrace deposits</b> - Sand and gravel deposited on erosional terraces at elevations between the original Sanford outwash plain surface and the modern flood plain.
<b>Pp</b>	<b>Presumpscot Formation</b> - Massive to laminated gray and blue gray (weathering brown) silt and silty clay. Locally may contain boulders, sand, and gravel. Occurs as blanket deposit over bedrock and older glacial sediments. Variable thickness from less than 1 m to more than 50 m. Deposited during period of late glacial marine submergence.
<b>Pgo</b>	<b>Outwash</b> - Sand, gravel, and minor silt deposited by glacial streams in a proglacial (away from ice) setting. Generally confined to major river valleys. Sometimes terraced. Average thickness probably between 5 and 10 m.
<b>Pgos</b>	<b>Sanford outwash plain deposits</b> - Glaciofluvial sand and gravel deposited as an extensive outwash plain in the Mousam and Great Works River Valleys.
<b>Pmd</b>	<b>Marine delta</b> - Coarse sand and gravel grading to sand and silt. Flat to gently sloping constructional surface formed by glacial streams discharging into late-glacial sea. Heads of deltas are commonly kettled (Pmdi) and mark ice frontal positions. Sediments in distal portions of deltas (Pmdo) commonly grade into glacial marine sediments (Pp, Pmrs). Variable thickness from more than 30 m at delta head to less than 1 m at delta toe.
<b>Pgi</b>	<b>Ice-contact deposits (undifferentiated)</b> - Coarse gravel and sand in areas not mapped as deltas or Pge. Primarily kettled glacial stream deposits in the immediate vicinity of eskers (Pge). Average thickness probably between 10 and 15 m.
<b>Pge</b>	<b>Esker</b> - Coarse gravel and sand comprising distinct linear ridge forms, mostly in major valleys. Generally surrounded by Pgi deposits, and terminating in ice-contact deltas (Pmdi). May be more than 10 m thick.
<b>Pem</b>	<b>End moraine</b> - Coarse gravel and sand, some till and silt. Generally occur within glacial marine sediments (Pp, Pps), and are complexly interstratified with them. Formed at or near the ice front during retreat of marine-based glacier. Sediments commonly display significant deformation. May occur as a series or complex of moraines (Pemc). Commonly 5 to 10 m thick.

<b>Pt</b>	<b>Till</b> - Gray to gray brown poorly sorted mixture of silt, sand, pebbles, cobbles, and boulders. Forms a blanket deposit over bedrock, and is inferred to underlie younger sediments where not exposed at surface. Thin over topographic highs; thickness in topographic lows. May occur in and over end moraines (Pem, Pemc). Averages 3 to 5 m in thickness.
	<b>Bedrock</b> - Rock units not distinguished. Individual outcrops not shown in large areas of poor access. Ruled pattern indicates areas where surficial materials are thin (less than 1 to 2 m) and bedrock exposures are common. Areas of bedrock exposure (gray areas) are mapped in part from aerial photographs.
	<b>Contact</b> - Boundary between map units (dashed where approximate).
	<b>End moraine</b> - Ridge of sand and gravel or till deposited at margin of glacier. May be largely buried by younger sediments.
	<b>Scarp</b> - Symbol indicates scarps formed by stream erosion, or by marine erosion during period of higher sea level, as well as constructional scarps on delta margins. Ticks are on downslope side of scarp line.
	<b>Ice-margin position</b> - Line shows approximate position of the glacier margin during ice retreat, based on positions of meltwater channels and heads of ice-contact deltas.
	<b>Esker ridge</b> - Sand and gravel ridge deposited in a meltwater tunnel within or beneath glacial ice. Chevrons indicate direction of meltwater flow.
	<b>Grooved till surface</b>
	<b>Area of many large boulders</b>
	<b>Kettlehole</b>
	<b>Meltwater channel</b>
	<b>Glacially streamlined hill (drumlin)</b>
	<b>Azimuth of glacial striation</b>
	<b>Glacial marine delta</b> - Number is surveyed elevation (in feet) of late-glacial sea level indicated by contact between delta topset and forest beds (from Thompson and others, 1989, and W. Thompson/C. Kotof unpublished).

### USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

### OTHER SOURCES OF INFORMATION

- Smith, G. W., 1998, Surficial materials of the Alfred quadrangle, Maine: Maine Geological Survey, Open-File Map 98-181.
- Neil, C. D., 1998, Significant sand and gravel aquifers of the Alfred quadrangle, Maine: Maine Geological Survey, Open-File Map 98-147.
- Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print)
- Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
- Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, in Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.